



# New Road Primary and Nursery School

## Mathematics Policy

### Intent of the School's Curriculum

#### A child who attends New Road Primary School and Nursery will be:

a positive person who is well read; great at learning; motivated and curious with a breadth of experience; whose family is supportive of what the school can offer.

All staff at New Road Primary and Nursery School are committed to ensuring that every child:

- Will be a really good reader, know lots of words and how to use them!
- Will know how to be a great person and how to learn really well!
- Will have lots of different experiences both in and outside of school!
- Will be motivated and curious as a result of excellent teaching and a great curriculum!
- Will have lots of opportunities to involve their family in what happens at school!

By the end of primary school, students will become confidently fluent in the fundamentals of mathematics; will reason mathematically; and will apply their mathematics to solve challenging problems. Students will develop the fundamental mathematical knowledge and skills required in every-day life. Importantly, they will develop the ability to think mathematically which will empower them to be successful and navigate the challenges of their education and life after school in our fast-changing world. They will have an appreciation of the power of mathematics, a sense of enjoyment and curiosity about the subject.

The national curriculum for mathematics aims to ensure that all pupils:

- Become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **Reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- Can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

### Aims and Purposes of Maths

We aim to develop motivated, creative and resilient mathematicians who can confidently apply what they learn. We do this by:

- Developing and nurturing a resilience based on the belief that everyone can do mathematics.
- Teaching new skills and encouraging the children to practise and develop fluency.
- Developing procedural fluency and conceptual understanding in tandem because each supports the development of the other.
- Using concrete, pictorial and abstract activities in turn to support understanding.
- Teaching children to reason and, therefore, explain/deepen their understanding.

- Revisiting and consolidating areas of study, spending significant time developing deep knowledge of the key ideas that are needed to underpin future learning.
- Making connections at the optimum time.
- Emphasising the structure and connections within the mathematics, so that pupils develop deep learning that can be sustained.
- Providing the 'tools' needed to be a 'problem solver' both in maths and in other areas of the curriculum.
- Pitch lessons to challenge all to reach the highest standard.
- Promoting the relevance of maths in real life scenarios.
- Regularly and diagnostically assessing children's outcomes and measuring progress.

As a result of this learning, our children will:

- Learn number facts and times tables to automaticity to avoid cognitive overload in the working memory.
- Solve problems efficiently and think logically.
- Be **resilient** in their learning.
- Be **reflective** and able to discuss and evaluate their work with confidence.
- Reach the highest standard possible and to think for themselves within the subject.
- Be confident to talk about their work.
- Be confident to work mentally
- Be the best that they can be independently, select **resources** to help their understanding as they need them.
- Be prepared for applying their skills effectively in everyday life situations, in their future learning and in the work place.

Our approach to the teaching of mathematics focuses upon high quality teaching of mathematics, in order to introduce, and then secure and embed key concepts. At Burley Oaks Primary School, we teach for mastery.

## The Mastery Approach

Teaching for mastery is an approach, not a teaching style. Mastering mathematics is a gradual, cumulative process that creates mathematical tools for life. Mastery is what we want pupils to acquire (or go on acquiring).

Through a rich diet of challenge, investigation and problem solving on a daily basis, all children will learn to understand and clarify information; consider what they know that will help them to solve problems; realise what they need to know next; create systems and strategies; organise information in a way that helps find patterns and solutions; investigate open ended challenges and to communicate and present their findings effectively.

The depth of understanding of an individual, be it emerging, developing or secure in a given objective, will be challenged in a wide variety of formats in order to challenge and solve problems at their level. Children will expect and welcome challenges which push them to deepen their learning at all levels. Problems are not solely for those who excel in maths.

## Content/Organisation

New Road Primary School has adopted the White Rose Maths Hub Scheme of work which systematically builds maths knowledge, skills and understanding. Teaching will cover each the following areas of mathematics from the National Curriculum 2014:

Number  
 Calculations  
 Fractions, decimals and percentages  
 Measurement  
 Geometry  
 Statistics

The focus of our learning is based on:

- the use of concrete, pictorial and abstract methods.
- fluency, reasoning and problem solving questions.
- a variety of questions that help children to progress to understanding with greater depth.

Where links can be made across units we will endeavour to do so, in order to create a mathematics curriculum which is not compartmentalised.

Maths is taught daily for a period of between 45minutes and an hour. It is also applied through other aspects of the curriculum to ensure that our children have the opportunity to practise their skills and knowledge repeatedly, and through different aspects of their learning.

In Reception, The Foundation Stage curriculum is organised into prime and specific areas of learning with an aim of children meeting the early learning goals. The area of Maths is split into Number and Shape, Space and Measures of which problem solving, reasoning and numeracy are all a part. Please refer to the Early Years Foundation Stage (EYFS) policy for further details.

## Planning

Planning begins from a **thorough understanding of children's needs** gleaned through effective and rigorous assessment and tracking, combined with high expectations and ambition for all children to achieve.

All staff are required to complete **weekly short term** maths planning identifying which parts of the 2014 Primary National Curriculum in England, Mathematics, are being covered. Medium and Long term frameworks have been adopted from the White Rose Maths Hub schemes of work.

Within short term planning, clear **criteria** for each learning objective taught is created using a differentiated star system- demonstrating the progression needed to reach and exceed the objective. This will enable the class teacher to follow a **clear and systematic teaching sequence**, where input and activities are differentiated by considering which parts of the success criteria individual children are ready for.

In specific circumstances, where children are working significantly below the majority of the class, and where adapting the success criteria seems inappropriate, objectives from lower age-groups will be planned and taught.

Class teachers should plan for daily opportunities for children to apply their maths skills to different problems within maths lessons and across the curriculum. This will also allow children to revisit, practise and consolidate different areas of maths and apply them within different contexts.

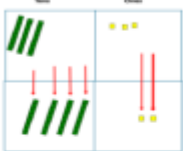

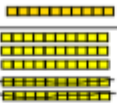
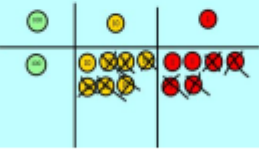
When planning across the curriculum for all children, questions should be used within lessons, in the form of a 'challenge' or problems which require the pupil to demonstrate their ability to apply the skill and in doing so deepen their understanding. The planning for these opportunities will be supported through reference to quality resources, such as progression papers with reasoning, which are published on the website for the **National Centre for Excellence in Teaching Mathematics, the White Rose Maths Hub** and also the activities on the **NRich website**.

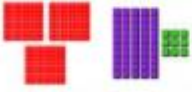
## Learning and Teaching

- Pre-learning tasks define starting points for individual children so that teachers can tailor learning to support their needs.
- Tasks are provided specifically pitched to suit the needs of the child at that specific point in time.
- All groups are flexible and will change according to a continuous skills audit.
- Usually the class will be working on the same unit, allowing the teacher to work with the whole class, with groups of pupils and, at times, with individual pupils.
- Mostly pupils will be grouped according to their current level of ability in relation to an objective. Groups will be fluid and so will often vary on a daily basis.

- Throughout the lesson the teacher and other adults in the class will use questioning to clarify and challenge learners, and continually assess the effectiveness of the learning taking place.
- During the lesson, many pupils will talk about their work and be given opportunities to explain their thinking, using mathematic sentences (sentence stems).
- Pupils will be given daily opportunities for problem solving and reasoning using skills they are fluent in.
- In the Foundation Stage, children are given the opportunity to develop their understanding of number, measurement, pattern and shape and space through a combination of short, formal teaching as well as a range of planned structured play situations, where there is plenty of scope for exploration.
- Children will become very competent 'counters' so that their fluency with the number system provides a foundation for mathematical understanding. Counting forwards and backwards in many different sized steps as well as from different starting and ending points is essential.
- Maths learning builds from a concrete understanding of concepts where children are manipulating objects.
- Children should be encouraged at all times to communicate their understanding of maths so that it clarifies their thoughts. Reasoning activities will use terminology such as: convince me..., explain..., is it true/false... why? Which is the odd one out? Prove it etc.
- Children's mental maths is of great importance, with number bonds, times tables facts and various strategies for calculation taught and practiced at school with support sought from parents through homework activities.
- A progression towards efficient written calculations should be developed and applied consistently in each year-group. The school Calculation Policy should be followed.
- Though the nature of lessons will be very different depending on the needs of the class, children should be: active; practising skills they haven't yet mastered (perhaps recapping on targets); learning something new OR learning to apply their knowledge to different contexts. They should be working at a good pace and being productive; sharing their thoughts and methods and being successful.

At New Road Primary School, we use models (concrete resources) and images (pictorial) to support our teaching sequence dependent on the needs of an individual child or group. (Please see table below.) When children are able to see concepts this way, they then need to understand the same concepts represented pictorially. Children are then ready for abstract representation before being able to apply their knowledge to different situations.

Objective and Strategies	Concrete	Pictorial	Abstract
Column method without regrouping	 <p>Use Base 10 to make the bigger number then take the smaller number away.</p>  <p>Show how you partition numbers to subtract. Again make the larger number first.</p>	 <p>Draw the Base 10 or place value counters alongside the written calculation to help to show working.</p>  <p>Calculations</p> $\begin{array}{r} 54 \\ - 22 \\ \hline 32 \end{array}$ <p>Calculations</p> $\begin{array}{r} 176 \\ - 64 \\ \hline 112 \end{array}$	$47 - 24 = 23$ $\begin{array}{r} 40 + 7 \\ - 20 + 4 \\ \hline 20 + 3 \end{array}$ <p>This will lead to a clear written column subtraction.</p>

Place Value	<p>Read and write numbers up to 1000 in numerals and in words.</p>	<ul style="list-style-type: none"> <li>Fill in the blanks</li> </ul> <table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: left;">Numbers in words</th> <th style="text-align: left;">Numerals</th> </tr> </thead> <tbody> <tr> <td>Four hundred and two</td> <td></td> </tr> <tr> <td></td> <td>560</td> </tr> <tr> <td>Three hundred and sixty six</td> <td></td> </tr> <tr> <td></td> <td>132</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>What number is represented by the Base 10? Write it in numerals and words.</li> </ul>  <ul style="list-style-type: none"> <li>352 children were on time for school this morning. Write this number in words.</li> <li>Five hundred and seventy people went to the school fair. Write this number in numerals.</li> </ul>	Numbers in words	Numerals	Four hundred and two			560	Three hundred and sixty six			132	<ul style="list-style-type: none"> <li>What number is represented in the place value grid?</li> </ul> <table border="1" style="width: 100%;"> <thead> <tr> <th>100s</th> <th>10s</th> <th>1s</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">● ● ● ●</td> <td style="text-align: center;">● ● ● ●</td> <td style="text-align: center;">● ● ● ●</td> </tr> </tbody> </table> <p>Using the same number of counters, how many different numbers can you make? Convince me you have found them all.</p> <ul style="list-style-type: none"> <li>Tim was asked to write the number four hundred and forty. He wrote 400 40. Do you agree with Tim? Explain why.</li> <li>Hannah has written the number five hundred and thirteen as 530. Explain the mistake that Hannah has made.</li> </ul>	100s	10s	1s	● ● ● ●	● ● ● ●	● ● ● ●	<ul style="list-style-type: none"> <li>Match the number in words to the number in numerals. Fill in the missing numbers.</li> </ul> <table border="1" style="width: 100%;"> <tbody> <tr> <td>Four hundred and sixty two</td> <td></td> <td></td> </tr> <tr> <td>Four hundred and twenty six</td> <td>4</td> <td></td> </tr> <tr> <td>Six hundred and forty two</td> <td></td> <td>4</td> </tr> <tr> <td>Two hundred and sixty four</td> <td></td> <td>6</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>There are 3 cards with a digit on each. Find every 3 digit number that could be made from the cards. Write out the largest, smallest and middle number in words.</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; background-color: #4a7ebb; color: white; padding: 5px; border-radius: 5px;">3</div> <div style="border: 1px solid black; background-color: #8e7cc3; color: white; padding: 5px; border-radius: 5px;">6</div> <div style="border: 1px solid black; background-color: #e69d00; color: white; padding: 5px; border-radius: 5px;">8</div> </div> <ul style="list-style-type: none"> <li>Work out the missing word: A number between 450 and 460. Four hundred and _____ six.</li> </ul> <p>Repeat this with different clues and numbers.</p>	Four hundred and sixty two			Four hundred and twenty six	4		Six hundred and forty two		4	Two hundred and sixty four		6
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**ALL children** will have exposure to reasoning and problem solving tasks to develop mathematical language and understanding and may need to spend longer on one part than another in order to ensure that knowledge is secure.

## Written Methods of Calculation

The 2014 Primary National Curriculum in England, Mathematics, sets out progression in written methods of calculation that highlights how children would move from informal methods of recording to a formal written method for each of the four operations.

The aim is that by the end of Key Stage 2, the great majority of children should be able to use an efficient written method for each operation with confidence and understanding. This guidance promotes the use of what are commonly known as ‘formal’ written methods – methods that are efficient and work for any calculations, including those that involve whole numbers or decimals. They are compact and consequently help children to keep track of their recorded steps. Being able to use these written methods gives children an efficient set of tools they can use when they are unable to carry out the calculation in their heads or do not have access to a calculator. We want children to know that they have such a reliable, written method to which they can turn when the need arises.

In setting out these methods, the intention is that we adopt a greater consistency in our approach to calculation so that all teachers understand which methods in which we work towards. Children are entitled to learn how to use the most efficient methods for them personally (for further information see the school’s calculation policy).

## Assessment, recording and reporting

### Formative Assessment

Assessment for learning should occur throughout the entire maths lesson, enabling teachers/teaching assistants to adapt their teaching/input to meet the children’s needs. This feedback should be incisive and regular.. Pupils’ work should be marked in line with the Marking Policy.

Future lesson design should depend on class success evaluated through marking and observations made during the lesson. If understanding is still not secure at the end of a taught unit, this will be addressed by the class teacher.

## **Summative Assessment**

During the year, each child's progress should be recorded by the class teacher with regard to their progress towards meeting the end-of-year expectations for their year group. This will take the form of a half-termly assessment using either HeadStart, Pixl or past SATs papers.

## **Inclusion, SEN and Differentiation**

In order to provide all pupils with relevant and appropriate work at each stage:

- We plan suitable learning challenges.
- Respond to pupils' diverse needs through pre-learning tasks.
- Endeavour to overcome potential barriers to learning through quality teaching and intervention as required.